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Continuing Education Course #624
Electronics
Course II Fundamental Devices

1. The bandwidth of an amplifier is measured at the 3 dB downpoints. What is the normalized power at the 3 dB downpoint?
- a. 1/2
- b. 1
- c. 3
- d. 6

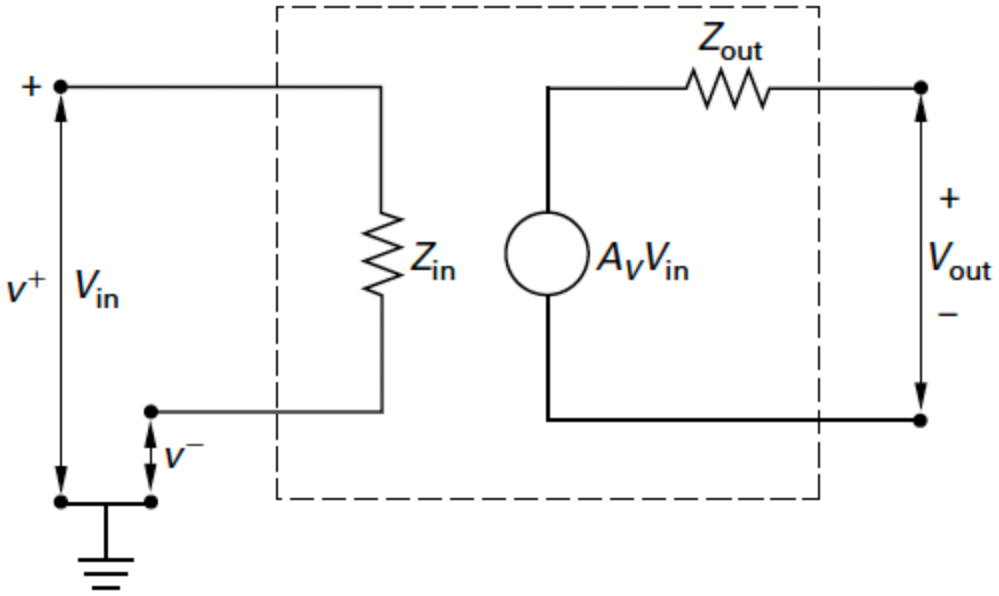
2. An operational amplifier has a gain of 10^5. The frequencies at the half-power points are f_L = 500 Hz and f_H = 1000 Hz. What is most nearly the figure of merit?
- a. 1×10^6 rad/s
- b. 5×10^7 rad/s
- c. 3×10^8 rad/s
- d. 6×10^8 rad/s

3. A low-pass filter has a resonant frequency of 10_2 Hz. What is the Gain-Bandwidth product for an amplifier with a gain of 10^5?
- a. 10^2 Hz
- b. 10^5 Hz
- c. 10^7 Hz
- d. 10^9 Hz

4. What is an operational amplifier's input signal range when the supplying voltage is 12 V and the voltage gain is 10^8?
- a. 0.09 μV
- b. 0.09 nV
- c. 0.12 μV
- d. 0.12 nV

5. What is the common mode voltage for an input signal range of 9×10^{-8}?
- a. 0.045 μV
- b. 0.045 nV
- c. 0.065 μV
- d. 0.065 nV

6. What equivalent circuit is shown below?



- a. Common Collector Buffer
- b. Common Emitter Follower
- c. Operational Amplifier
- d. Transistor Amplifier

7. The input impedance of an op amp is 10^6 Ω. The feedback is used to keep the voltage difference between the input terminals at 0.12μV.

What is the value of the input current?

- a. 0.12 pA
- b. 1.2 pA
- c. 12 pA
- d. 120 pA

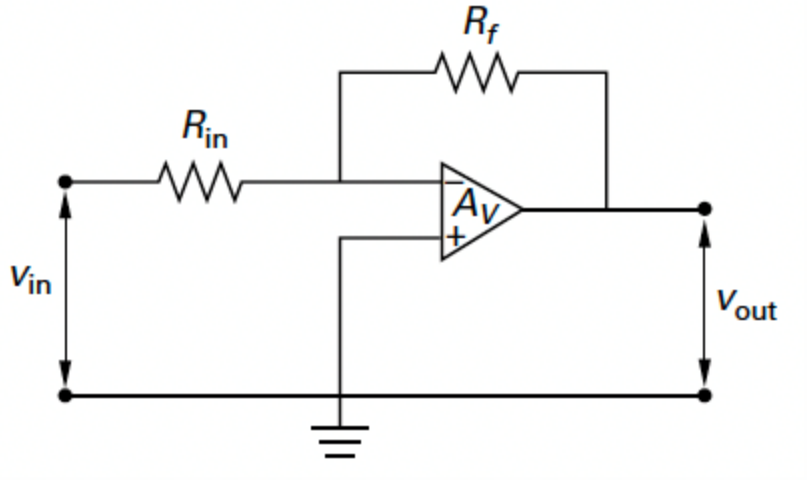
8. Which of the following is NOT a property of an ideal op amp?

- a. $A_V \approx 10^{12}$
- b. $BW = \infty$
- c. $Z_{\in} = \infty$
- d. $Z_{out} = 0$

9. Because of the assumptions made for an ideal op amp, the current in to each input is _____.

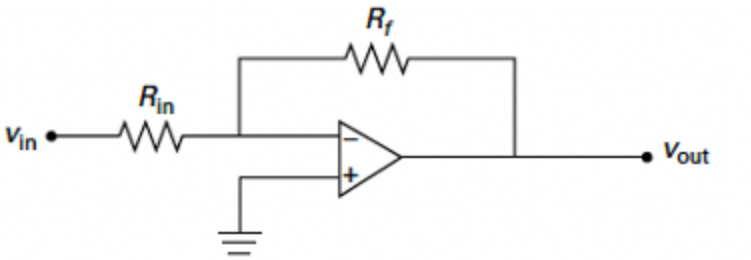
- a. depends on the feedback
- b. grounded
- c. small
- d. zero

10. Consider the circuit shown. The feedback resistance is 10 kΩ, and the input resistance is 100 Ω. If the op amp gain is 10^5, what is the gain of the circuit? [Use ideal op amp assumptions.]



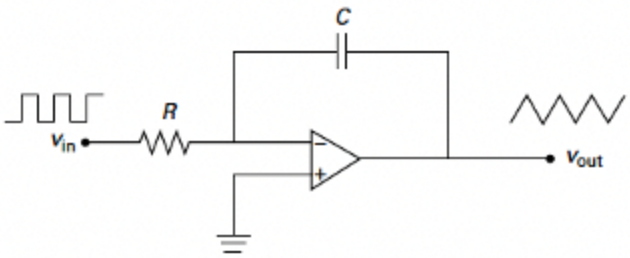
- a. -100
- b. -90
- c. 100
- d. 10^5

11. What type of amplifier is shown?



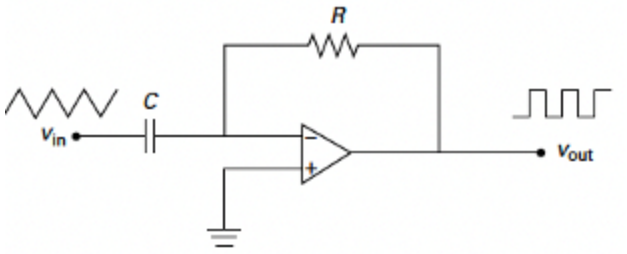
- a. feedback
- b. integrator
- c. inverting
- d. summing

12. What type of amplifier is shown?



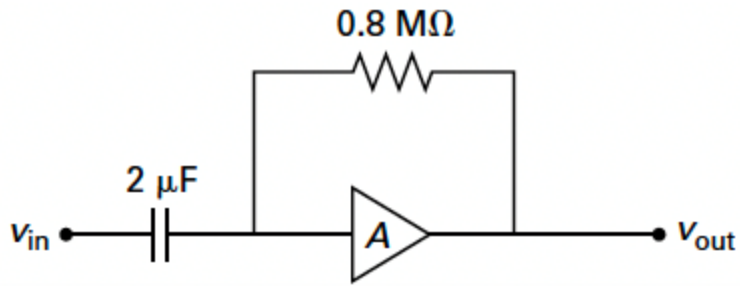
- a. feedback
- b. integrator
- c. inverting
- d. summing

13. What type of amplifier is shown?



- a. differentiator
- b. integrator
- c. inverting
- d. summing

14. In the circuit shown, if v_{in} is sin $30t$, what is v_{out}?



Assume the op amp is ideal and has infinite gain.

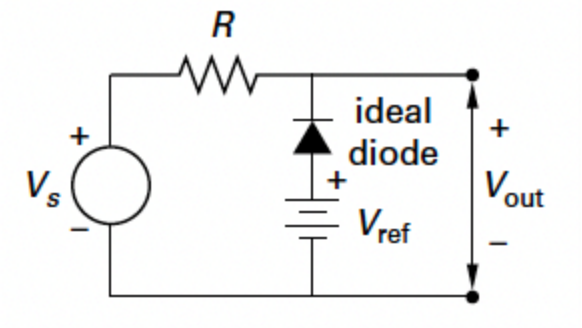
- a. 1.6 sin $30t$
- b. 1.6 cos $30t$
- c. -48cos $30t$
- d. -48sin $30t$

15. An operational amplifier has an input resistance of 10^5 Ω and a bandwidth of 1000 Hz, and is at a room temperature of 300K. Hint: Start with the SNR equation; then use the noise power equation.

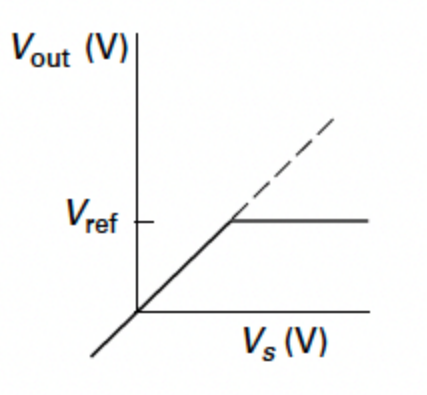
If 10 dB above the noise is required or proper operation, what is the required signal power?

- a. 0.10 μV
- b. 2.0 μV
- c. 4.0 μV
- d. 16 μV

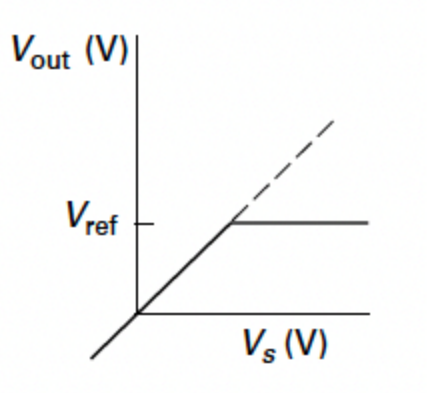
16. Consider the circuit shown.



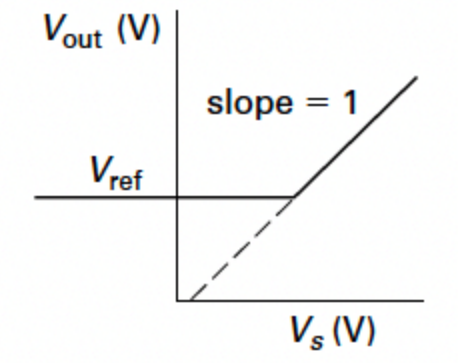
What is the output of the circuit? What is the name of the circuit?

○ a. 

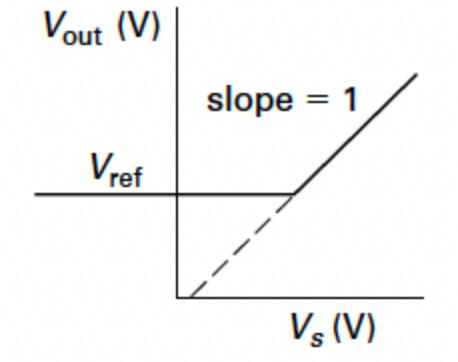
/ clipper circuit

○ b. 

/ limiter circuit

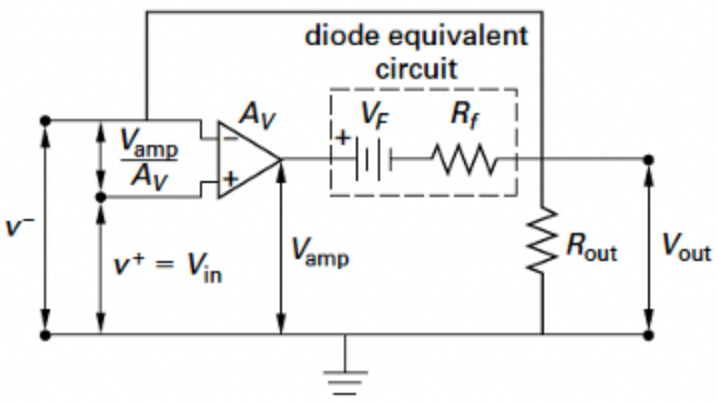
○ c. 

/ clipper circuit

○ d. 

/ limiter circuit

17. Consider the precision diode shown with a 9 V power supply and a voltage gain of 10^7.



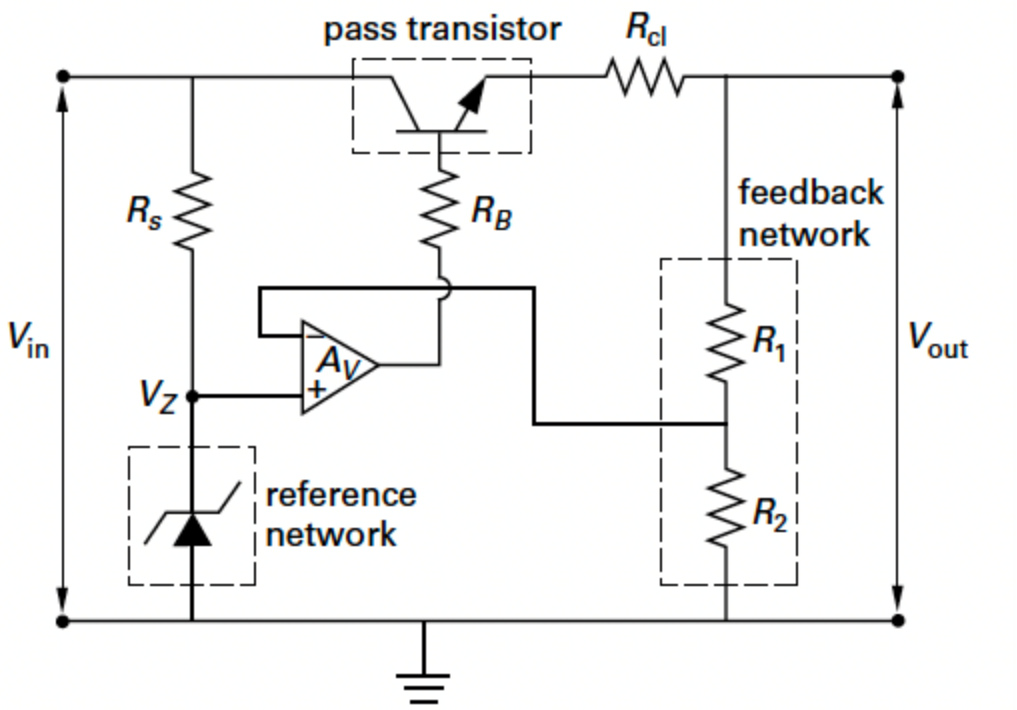
What is the maximum voltage difference that can be amplified without distortion or saturation?
Hint: Use the constraint equation.

- a. 0.6 µV
- b. 0.9 µV
- c. 6 µV
- d. 6 V

18. A zener diode is meant to operate in the _____ region.

- a. avalanche
- b. breakdown
- c. forward region
- d. forward biased

19. Consider the regulator circuit shown.

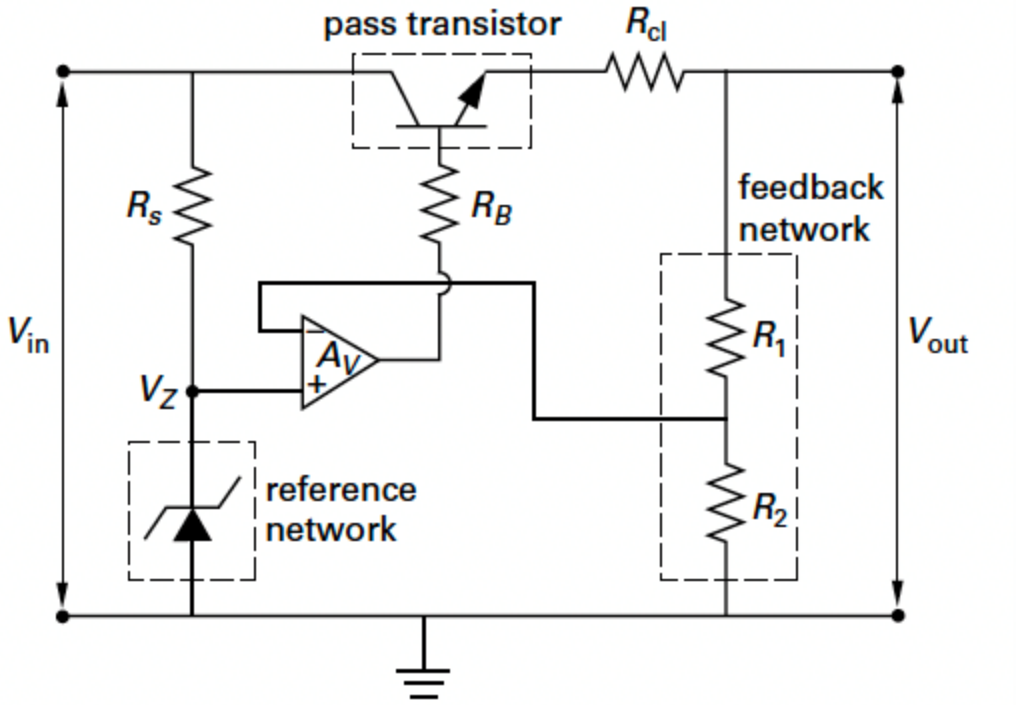


What formula represents the input to the op amp?

- a. V_Z
- b. $-\delta V_{out}$

○ c. δ
○ d. $V_Z - \delta V_{out}$

20. Consider the regulator circuit shown.



The pass transistor is meant to provide a _____ gain.
○ a. current
○ b. isolation
○ c. resistance
○ d. voltage